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Israel's Vocational Training

Adrian Ziderman

Vocational secondary schooling costs much more than other types of job training in Israel — and appears not to lead to correspondingly higher earnings.

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Eighty percent of the trainees headed for Israel's labor force go to full-time vocational secondary schools that devote a third to a half of the curriculum time to general studies. Students tend to come from a higher socioeconomic level than those in other training programs.

The rest of Israel's vocational students are evenly divided among the Ministry of Labor's remaining three programs. The apprentice attends school one day a week and works on the job the rest of the time. The student is typically a low academic achiever with a low socioeconomic background.

Students in industrial schools spend three days a week in the plant where the school is located and three days in the school. The program is less demanding and more practical than the vocational school curriculum. No tuition is charged and trainees are paid for their work.

The one-year full-time training courses for 16 and 17-year-olds, many of whom are dropouts, concentrate on practical training. Those who complete the course get additional training in the army during their compulsory three-year service.

Of the four types of training in Israel — vocational secondary schools, apprenticeship courses, industrial schools, and full-time training courses — vocational school is by far the most expensive. In 1977 Michael Borus found that the cost of apprenticeship courses was one-seventh that of vocational schools; industrial schools and training courses cost only a third to a quarter as much. This 7-year longitudinal study confirms Borus' earlier tentative findings, concluding that since post-training earnings were roughly the same for all four programs, the apprenticeship system was the most cost-effective.

These findings echo those of case studies in other countries. But, to conclude that vocational training schools are not cost-effective on the basis of eventual earnings alone is to ignore part of the picture. The goals of the vocational secondary school in Israel extend beyond those of providing usable labor market skills. These wider social and educational goals are largely absent from the narrower and more work-oriented types of training. In any cost-benefit evaluation of vocational schooling, these goals would have to be given more weight.

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Introduction

In a widely quoted paper published a decade ago, Michael Borus[1] drew a cost effectiveness comparison between four vocational training modes for youth in Israel - vocational secondary schools, the traditional apprenticeship, factory-based industrial schools and intensive one-year state-run teenager courses. Examining the 1969 and 1970 earnings of a sample of 540 Israeli youngsters, born in 1947 and who had completed one of these training courses, Borus found that the relatively expensive, formal vocational secondary school courses were associated with a level of post-training earnings not significantly different from the earnings derived from the three lower-cost alternative types of program. In particular, the non-formal apprenticeship courses were found to be very cost effective in relation to secondary vocational school courses.

These findings had important policy implications both in the domestic Israeli context as well as in the wider comparative international one. Whatever the institutional-historical reasons that may have accounted for the division of the training effort for youth amongst the various training modes in Israel,[2] these vocational training arrangements for the skilled trades are, over all, simply not cost-effective. Given that some 80 per cent of skilled workers in Israel are trained in vocational secondary schools, with only a minority receiving their training from job-

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1/ Michael E. Borus, "A Cost Effectiveness Comparison of Vocational Training for Youth in Development Countries: A Case Study of Four Training Modes in Israel", Comparative Education Review, 21 February 1977): 1-13.

2/ On this, see Yaacov Iram and Chaim Balicki, "Vocational Education in Switzerland and Israel: A Comparative Analysis", Canadian and International Education, Vol. 9 (1980): 95-105.

based apprenticeships, these results indicated the desirability, on economic grounds, of re-balancing the training effort in the direction of informal, industry-based methods.

However, the paper emphasized the tentative nature of these findings as well as policy conclusions emanating from them, in view of the relatively short post-training time horizon on which they were based - at most five to six years, which included a three year period of compulsory army service. This note of caution was felt to be particularly appropriate with regard to the two mainstream modes, vocational secondary school and apprenticeships. In Israel, the former courses differ from the latter in giving due emphasis to general academic studies and to the theoretical, in addition to the purely practical, aspects of training; they would therefore be expected to prepare these students better for long-run advancement in their vocations. As Borus concluded, "such advancement with attendant earnings gains could not be identified in the present study. Future studies should attempt a longer follow-up period." This caveat constitutes the point of departure for the research reported in the present paper, in which the original sample (broadened by the inclusion of an additional cohort of former trainees born in 1948) is followed over a further 6-year period of experience in the labor market. Our new results prove to be confirmatory of the earlier ones which related to a very much shorter follow-up period and, in particular, they confirm the cost effectiveness of the apprenticeship over the vocational secondary school mode of training.

The caveat also evoked an imaginative response from Victor Levine,[3] who attempted to take account of the effect on the earnings profiles of possible additional on-the-job training acquired after course

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3/ Victor Levine, "Evaluating Vocational Training Alternatives Using Single Period Earnings Data: A Technical Note", Comparative Educational Review, 23 (February 1979): 125-133.

completion. Levine proceeded to compute social and private rates of return on investment in vocational secondary school training in relation to each of the other training modes. These results have been quoted authoritatively.[4] We review Levine's results in the light of the new findings presented in this paper.

Training Modes For Youth

The four distinct types of vocational training for youth in Israel which constitute the focus of this comparative study, differ in curriculum, length, as well as socio-economic background and academic level of student. Here we provide little more than a brief overview of these programs; the reader is referred to the earlier study by Borus[5], as well as to those by Iram and Balicki[6] and by Harberger[7], for a fuller account.

The dominant form, accounting for some 80 percent of trainees, is the vocational secondary school. Vocational schooling is full time and has three tracks, the highest one leading to the bagrut (matriculation) and entry to higher education. Curriculum varies according to track: one third to a half of curriculum time is given to general studies, the remainder split between theoretical studies relating to the training trade and workshop practice. These schools, run by the Ministry of Education, are selective, charge tuition and attract pupils of a higher socio-economic

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4/ See D. Metcalf, Economics of Vocational Training: Past Evidence and Future Evaluations (Washington DC: The World Bank, 1985).

5/ Borus

6/ Iram and Balicki

7/ Perez F. Harberger, Vocational Education in Israel (Jerusalem: Ministry of Labour March 1967)

level than in other programs. For the rest, training is roughly split between the remaining programs of the Ministry of Labor. The apprentice attends school one day a week, the rest spent on practical training with his employer; he is typically a low academic achiever, with a low socio-economic background. The industrial schools are located at the plants of major firms and provide three days a week of practical training in the firm's plant and 3 days of education in the school attached to the factory. The program is more practically oriented and less demanding than the vocational schools, no tuition is charged and trainees receive payment for their output. One-year full-time training courses for 16 to 17-year-olds (many of whom are drop outs) are devoted almost entirely to practical training. Under a special agreement, the army provides both additional training and employment in the training specialty for completers of these latter courses during the 3-year compulsory army service following training.

Vocational schooling is by far the most costly mode. Borus showed the average societal cost per completer of apprenticeship courses to be only one seventh of that of vocational secondary school courses, yet these two major alternative training regimes yielded roughly equal earnings. Similarly, industrial schools and short teenager courses also resulted in similar earnings to vocational secondary schools, but courses completer costs were only from one third to one quarter of the costs in vocational schools.[8] Thus, apprenticeship courses were found to be the most cost effective by far of available alternative training programs for youth in Israel.

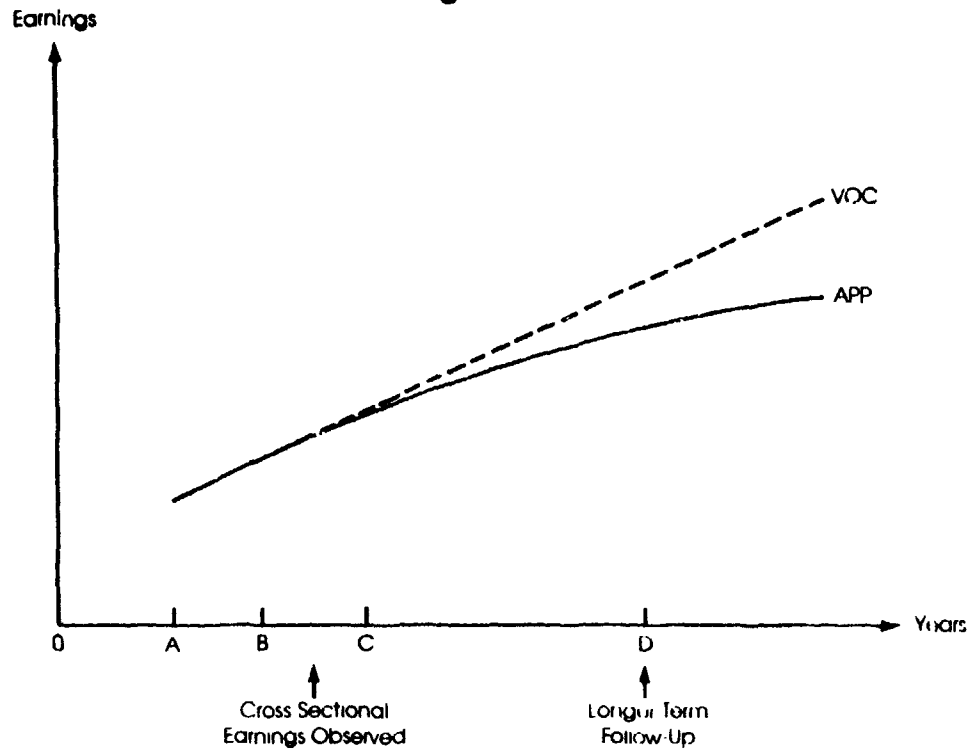
8/ Borus.

Methodology

The central question at issue is would the results of the earlier Borus study, relating to only two years of labor market experience following training (and, subsequently, three years army service), he confirmed when longer follow up periods are employed? Given the far greater input of general educational studies and training theory in the more formal industrial schools and, particularly, vocational secondary schools, it might be thought that, over the longer term, graduates of these institutions would achieve higher earnings than those of job-related, informal but perfunctory training modes. The wider scope of the educational programs offered in the more formal training institutions would mark out their graduates as those who would be better equipped to learn from experience on-the-job, be more likely to be selected for junior supervisory tasks and, generally, to be more upwardly mobile within the internal labor market of the firm.

This, is illustrated in Figure 1. While in the initial years of post-training experience (between B and C) the cross-sectional earnings of both apprenticeship and vocational secondary school course completers may be observed to lie at roughly the same level, over the longer term the average age-earnings profile of vocational school graduates would assume a steeper slope, generating a positive earnings (and significant productivity) gap between vocational school and apprenticeship course completers. Only longitudinal earnings data (as at year D) and unavailable to Borus, would pick up this earning gap. Of course, the identification of such an earnings gap would not, in itself, indicate that the policy conclusions stemming from the earlier work were incorrect; but it would point to the need for a wider investment appraisal of the various training program alternatives, in terms of a comparison of the net present value of the long-term earnings stream minus costs for each training mode.

Figure 1



We returned to the original trainee sample - male graduates of the four training modes in the Tel Aviv area, all born in 1947. Borus had collected training and other background information relating to an additional cohort of trainees born in 1948, but they were not included in his earnings follow-up regressions. The sample was broadened to include the 1948 cohort of trainees, thus extending the small numbers of observations (from only 37 to 112) from the industrial school and short teenager course modes. Information on training trade (whether automotive, electrical or metal working trades), course length as well as name and (7 digit) identity number was available for each former trainee.

The earlier work of Borus was then duplicated for the (now extended) sample of completers of youth training courses but over a 6-year longer training period, and with certain changes in the form of the earnings equation regressions. These personal data relating to the sample were matched with individual earnings records maintained by the National

Insurance Institute (NII), for each of the years 1969-1976. The NII was asked to supply names and earnings data for each individual in the sample, on the basis of identity number. The earnings records maintained by the Institute are based on employee earnings reported by employers for purposes of national insurance payments. The earnings data made available to us by the NII gave information on the total annual earnings for each individual, accumulated across employers, as well as the number of months in the year for which earnings were reported. Since the NII records are recorded only by the last six digits of identity numbers, multiple earnings records were provided for each identity number requested. The matching of the individual trainee data with appropriate earnings data on the basis of a common name proved to be no easy task. Name changes, death, war casualty and emigration were among the factors militating against any straightforward matching of the training data with the NII earnings records. In all, 1233 matchings were achieved - some 72 percent of the original male trainee sample (Table 1).

Table 1

Length of Course, Four Training Modes

Length of Course	Vocational Secondary School	Apprenticeship	Industrial School	Short Teenager Course	All Modes
1 year or less	-	5	-	58	63
13-35 months	-	79	-	1	80
3 years	118	572	31	-	721
4 years	347	-	22	-	369
Total sample	465	656	53	59	1233

In a series of regressions, each relating to one of the years 1969-1976, earnings (EARN) are regressed against type of training program (TP), holding constant the effects of training trade (TT), length of course (LEN),

year born (YB), year of course completion (COMP), and immigration status (IMM). We discuss each of these variables, in turn.

The dependent variable (EARN) relates to individual earnings. The NII supplied information on recorded earnings for the identified sample of course completers; this measure might appear to be the technically appropriate one as it includes all those with earnings gaps and thus takes account automatically of unemployment which may differ by training mode. Yet, these gaps, particularly when zero annual earnings result, may reflect, rather more, such factors as temporary withdrawal from the labor force because of study, illness or periods spent abroad, than reflecting unemployment. Including only those individuals with positive earnings for any annual regression run provides a way of overcoming the problem of lengthy earnings gaps; but again, not all earning gaps of less than a year reflect unemployment. Both measures were tried in alternative regression runs. Since similar results were obtained, we present only those regressions in which EARN is measured by positive earnings. We used natural (positive) earnings as the regressor, rather than the more usual log specification, in order to keep our results comparable with those of Borus, who used the natural earnings measure. However, since all of our earnings observations relate to one small part of the age cross-section profile, there is less reason to fear that the earnings distribution in our sample departs from normality; the case for using log earnings thus becomes less compelling.

Training mode (TP) was entered as dummy variables: APP (apprenticeship), IND (industrial school), TEEN (teenager course), with VOC (vocational secondary school) in the constant term. Trainees had qualified in one of the three major training trades (TT) taught in the programs under study - electrician trades (ELEC), automobile mechanics (AUTO) and metal working trades (METAL). TT, entered as dummy variables, was included in the regressions to eliminate any differential effect of training occupation on subsequent earnings. Length of course (LEN), measured in units of a year,

differs both within and between training modes (Table 1). Lengthier courses, in augmenting individual human capital stocks, should lead to higher earnings.

Trainees completed their courses in different calendar years, from 1964-1967 (Table 2). Year of course completion (COMP) is added as a continuous variable in serial form 1-4, corresponding to the years 1964-1967; the higher the value on the COMP coefficient, the lower would be expected earnings. Year of birth (YB) enters as a dummy variable (1947 = 0; 1948 = 1). Information on year of immigration was provided with the earnings data, by the National Insurance Institute. Since the labor market performance of non-immigrants might be superior to that of immigrants, a dummy variable immigrant status (IMM) was included (Israel born = 0; Immigrant = 1).

Table 2

Year of Course Completion by Training Mode

Year of Completion	Vocational Secondary School	Apprenticeship	Industrial School	Short Teenager Course	All Modes
1964	17	157	-	7	181
1965	217	339	17	33	606
1966	191	119	31	19	360
1967	40	41	5	-	86

Results

Turning first to the two dominant training alternatives, VOC and APP, annual positive earnings in these trades are regressed against training program (with APP entering as a dummy variable and VOC in the constant term), and against other relevant variables for each of the years 1969 to 1976 (Table 3). Holding other variables constant, no significant differences between annual earnings of VOC and APP are reported apart from 1969, when the

lower annual earnings of APP (compared with VOC) is on the margin of significance only, at the 5 percent level; in general the overall findings (and policy conclusions) of Borus are confirmed. All of the other variables are insignificant for most of the years except for COMP. Earlier course completion leads to higher earnings at the beginning of the follow-up horizon (no doubt due to greater post-training market experience), though this earnings advantage gradually washes out. The earnings data for the years 1975 and 1976 were incomplete (many firms had as yet failed to report their employees' earnings) when received from the NII in the late 1970s. Because of the small number of observations for 1976, the regression results for that year are not reported here, but they do follow the general pattern.

Table 3

Regression of Annual Positive Earnings (Israeli lirot)* on Two Major Youth Training Programs, 1969-1975

	1969	1970	1971	1972	1973	1974	1975
Independent Variables**:							
Training Program:							
APP	-1055	-361	-52	-596	-1592	-87	-1480
	(2.37)	(0.88)	(0.09)	(0.85)	(1.56)	(0.06)	(0.40)
VOC	--	--	--	--	--	--	--
Training Trade:							
AUTO	-545	586	585	1147	439	-780	-905
	(1.43)	(1.13)	(1.19)	(1.95)	(0.52)	(0.66)	(0.30)
ELECT	71	22	87	416	396	1593	9460
	(0.17)	(0.06)	(0.16)	(0.64)	(0.42)	(1.20)	(2.92)
METAL	--	--	--	--	--	--	--
LEN	657	-1066	-492	-972	-159	473	2860
	(1.56)	(3.15)	(1.04)	(1.66)	(0.18)	(0.40)	(0.91)
COMP	-971	-731	-1512	-1801	-2139	-1501	-2890
	(4.10)	(3.60)	(5.30)	(5.08)	(4.22)	(2.06)	(1.62)
YB	-851	-215	3	482	56	-798	1424
	(1.70)	(0.72)	(0.01)	(0.92)	(0.07)	(0.75)	(0.54)
IMM	64	-291	-197	-401	-982	-2237	5047
	(0.21)	(1.03)	(0.49)	(0.82)	(1.41)	(2.27)	(2.04)
Constant***	11057	13098	14693	19965	24021	30059	37183
R^2	0.045	0.048	0.052	0.046	0.033	0.021	0.046
n	884	953	889	891	788	835	554

NB t statistic is shown in parentheses

* The Israeli lira has been superceded by the new shekel (1 new shekel = 10.000 lirot)

** For definition of independent variables, see text.

*** The constant term contains VOC, those born in 1947 and Israeli born.

Does the picture change when IND and TEEN training program variables are added as in the regressions shown in Table 4? A similar pattern emerges with regard to the other independent variables, and the regressions again have low overall explanatory power. With the other variables held constant, no significant earnings differentials are reported between VOC and between APP (again, except for 1969) and IND, respectively. However, for a number of the regression runs, the coefficient on TEEN is negative and significant. Although not in line with those of Borus, this particular result is not altogether unexpected: most of the students enrolled in TEEN came from low socio-economic backgrounds and many were drop-outs from secondary schooling. More important, the courses though full-time, lasted for up to a year only (compared with three or four years for other training modes, notably VOC).

Overall, we do not see evidence of an earnings gap emerging over the longer term between the different training modes and particularly between VOC and APP; the earlier results of Borus, relating only to two years post-training labor market experience, are largely confirmed.

Table 4

Regression of Annual Positive Earnings (Israeli lirot)* on Four Youth Training Programs, 1969-1975

	1969	1970	1971	1972	1973	1974	1975
Independent Variables**:							
Training Program:							
APP	-873	-233	-49	-606	-1721	-482	-2441
	(2.04)	(0.59)	(0.08)	(0.84)	(1.36)	(0.35)	(0.72)
IND	-40	459	1471	2406	1697	91	1876
	(0.05)	(0.68)	(1.50)	(1.86)	(0.73)	(0.04)	(0.31)
TEEN	-1427	-3317	-2928	-4723	-573	-3483	-6272
	(1.26)	(3.17)	(2.81)	(2.33)	(0.16)	(0.97)	(0.71)
VOC	--	--	--	--	--	--	--
Training Trade:							
AUTO	-584	388	839	992	791	-650	-1023
	(1.56)	(1.15)	(1.73)	(1.63)	(0.75)	(0.56)	(0.36)
ELECT	17	-44	46	371	468	1681	9558
	(0.04)	(0.12)	(0.09)	(0.54)	(0.40)	(1.28)	(3.05)
MET	--	--	--	--	--	--	--
LEN	-417	-871	-424	-1057	34	29	1634
	(1.25)	(2.83)	(0.93)	(1.84)	(0.03)	(0.03)	(0.61)
COMP	-1023	-824	-1439	-1659	-2578	-1488	-2168
	(4.53)	(4.25)	(7.42)	(4.62)	(4.19)	(2.06)	(1.30)
YB	-640	-180	-122	356	-570	-1297	536
	(0.08)	(0.63)	(0.30)	(0.67)	(0.63)	(1.27)	(0.22)
IMM	82	-316	-455	-341	-358	-2087	-5142
	(0.28)	(1.19)	(1.20)	(0.70)	(0.43)	(2.23)	(2.25)
Constant***	10342	12604	14477	19990	24248	31709	41616
R^2	0.049	0.051	0.052	0.040	0.030	0.025	0.052
n	972	1049	975	972	859	910	611

NB t statistic is shown in parentheses

* The Israeli lira has been superceded by the new shekel (1 new shekel = 10.000 lirot)

** For definition of independent variables, see text.

*** The constant term contains VOC, those born in 1947 and Israeli born.

Levine's Findings: A Retrospective View

We now take a fresh look at Levine's conclusions, in the light of our new findings. We have noted above that Levine reworked the results presented in the earlier paper by Borus to compute private and social rates of return to investment in these formal courses of training, after taking into account the effect on the earnings profiles of the possibility of additional, on-the-job, training acquired after training course completion. Although the ranges between Levine's rates of return estimates employing alternative assumptions were very broad, the superiority of apprenticeship over vocational school investments was confirmed; however, Levine's results were agnostic with regard to the comparative profitability of vocational secondary school courses vis-a-vis industrial schools and the short state-run teenager courses. Overall, the policy conclusions stemming from Levine's rate of return results were not incompatible with those of the cost-effectiveness comparison presented by Borus.

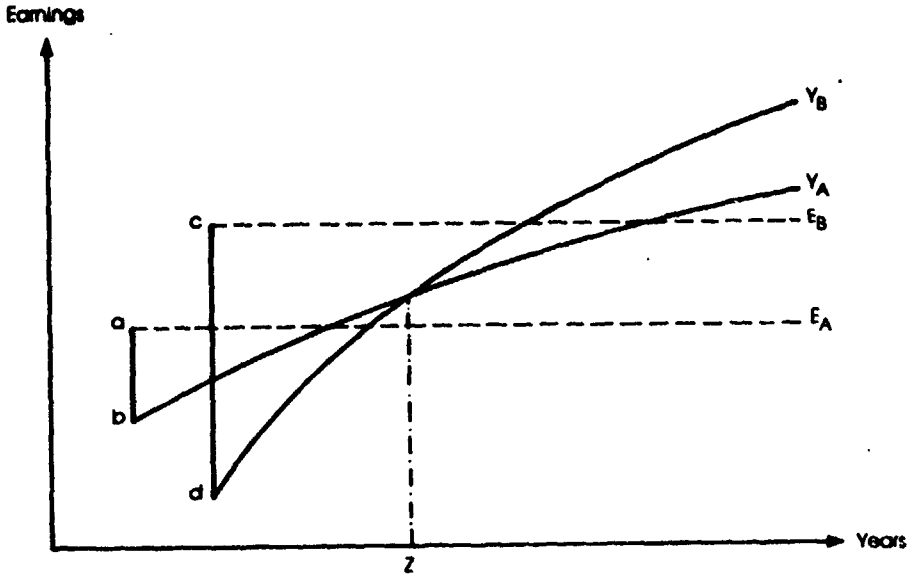
Levine's central assumption is that the Borus result, showing equal post-training course earnings for each training mode, was fortuitous: for periods other than that over which cross-sectional earnings happened to be observed, earnings would differ amongst training modes. Consider Figure 2.[9] Individual A has invested less in formal schooling and training courses than individual B and, in the absence of further training (on-the-job), would receive hypothetical earnings E_A ($< E_B$). Levine argues that A would be expected to invest less in general training on the job than B ($ab < cd$)[10] resulting in less-steep actual earnings profiles (Y) for A than B.

9/ Levine.

10/ Levine here follows the approach outlined in the well known human capital investment model of Yoram Ben-Porath, Production of Human Capital and Life-cycle of Earnings", Journal of Political Economy, 75 (August 1967): 352-365.

Y_A and Y_B coincide at Z, the time point at which cross-sectional earnings "happen" to be observed; for other years actual earnings of A and B differ.

Figure 2



The problem with this line of reasoning is that while offering a possible explanation for non significantly different earnings between two training modes at point Z, it is improbable that the separate wage profiles of all four training modes under scrutiny would happen to coincide at year Z. Average course length differs (Table 1), as does previous human capital investment for each training mode, factors which would result in differing subsequent investments in training on-the-job. As Levine himself notes: "persons with more formal schooling (and training) tend to have steeper age earnings profiles" and that those making "larger pre-entry investments..also tend to invest more heavily later on."[11] Thus, the vertical distance indicating initial investment in on-the-job training (e.g. ab for individual A.) would vary positively with previous human capital investments, as would the steepness of the earnings profiles.

11/ Levine, page 130.

(corresponding to Y_A in Figure 1), an assumption that is clearly at odds with Levine's Table 2 (derived from Borus) showing differing training costs for these three training modes. Thus little credence can be given to the particular rates of return results presented in Levine's paper, a conclusion that is buttressed by the findings, presented earlier in the present paper, that earnings do not differ significantly across the main training modes, over seven years of post-training experience in the labor market.

Summary and Implications

The earnings of 1233 former trainees in Israel were monitored over a seven year period. Earnings functions were estimated in the form of a series of multiple regressions, with annual earnings as the dependent variable and type of training program attended - vocational secondary school, traditional apprenticeship, factory-based industrial school and short Ministry of Labor teenage course - included amongst the independent variables. Generally, no significant differences in the earnings of the graduates of the different modes were found, in a series of regressions run on annual earnings data for the years 1969-1975.

These findings viewed against the relative costs of alternative training modes confirm those of an earlier study by Michael Borus relating to a much shorter post-training earnings follow-up period; they suggest that, on cost-effective grounds, the balance of training provision for youth in Israel is not efficient. The vast majority of skilled workers are trained in relatively expensive vocational secondary schools which, perhaps surprisingly, offer no earnings advantages (even in the longer term) over cheaper, work-related, training programs. On cost-effective grounds, the desirability of a redirection of the training effort in Israel towards more direct job-related training, and in particular the formal apprenticeship, is indicated.

Our finding that, in the context of training for the skilled trades, vocational secondary schools in Israel are not cost-effective, needs to be tempered with a note of caution. The goals of vocational secondary schooling in Israel, as is frequently the case elsewhere, extend beyond those of providing usable labor market skills, the focus of the present study. The wider social and educational goals of vocational schools in Israel, largely absent for the other, narrower and more work-orientated training modes, would have to be given due weight in any fuller cost-benefit evaluation of vocational schooling in Israel.

However, to the extent that our concern is with the labor market outcomes of vocational schooling, our negative findings echo those that emerge from the sizable case study literature on these issues from other countries.[12]

12/ For recent reviews see Metcalf, and C. Dougherty, Cost-Effectiveness of National Training Systems in Developing Countries: Issues and Experience, (Washington, DC: The World Bank, 1988).

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